

FOUR NEW SPECIES AND A NEW RECORD OF *CHIMARRA* STEPHENS  
(TRICHOPTERA: PHILOPOTAMIDAE) FROM BOUGAINVILLE ISLAND,  
PAPUA NEW GUINEA

DAVID I. CARTWRIGHT

13 Brolga Crescent, Wandana Heights, Victoria 3216, Australia

Abstract

Cartwright, D.I., 2001. New species and a new record of *Chimarra* Stephens (Trichoptera: Philopotamidae) from Bougainville Island, Papua New Guinea. *Memoirs of Museum Victoria* 58(2): 223–230

Descriptions and keys are provided for males of five species of caddisflies of the widespread genus *Chimarra* from Bougainville Island, Papua New Guinea, including four new species. Females of four species are also keyed and described.

Introduction

The cosmopolitan caddisfly genus *Chimarra* Stephens, 1829 has not been recorded from Bougainville Island, although 21 species have been described from mainland New Guinea (Papua New Guinea and Irian Jaya, Indonesia) (Neboiss, 1986; Malicky, 1994). Two have been described from the nearby Solomon Islands, Guadalcanal Island (9°32'S, 160°12'E) (Kimmins, 1957a). Specimens of the genus were collected during 1987–1990 by Ms Cathy Yule near Arawa (6°12'S, 155°32'E) and deposited in Museum Victoria, Melbourne. A total of 21 males and 18 females were sorted to five species. Females were paired with respective males on the basis of similarities in coloration particularly on the head, and on wing venation and locality.

The Bougainville Island *Chimarra* species display the following character states: in the forewing: the curved or sinuous Rs vein basal to the discoidal cell is associated with thickened veins in four of the species; abdominal segments VIII and IX are elongate in females of three of the four known species; lateral lobe processes are present on tergum X in males of all species; and in one species, the dense brush of small spines is present on the phallus. The forewing with vein Rs curved has been cited as a key diagnostic feature for the subgenus *Chimarra* (*Chimarra*) separating it from other subgenera of *Chimarra* in

the New World (Blahnik, 1998). This feature is also present in many species from Australia (Cartwright, in prep.), several species from Asia (Kimmins, 1957b, 1964) and Africa (Kimmins, 1963). Kimmins (1957b, 1962) reported that both *C. crepidata* Kimmins from India and *C. papuana* Kimmins from New Guinea have the phallus containing numerous spines at the apex, a characteristic also of *C. pinga* sp. nov.

Both males and females are most readily distinguished by genital features, often requiring the clearing of the abdomen in potassium hydroxide.

Figured specimens are identified by the notebook numbers of Dr Arturs Neboiss (NMV), prefix PT-; or the author; prefix CT-. Abbreviations for genital parts are indicated on Figs 1–3 and 21.

Depositories are abbreviated as follows: BMNH, the Natural History Museum, London; NMV, Museum Victoria, Melbourne.

*Chimarra* Stephens

*Chimarra* Stephens, 1829: 318.—Mosely and Kimmins, 1953: 398.

*Type species. Phryganea marginata*. Linnaeus, 1767 by monotypy.

*Remarks.* A diagnosis of the genus *Chimarra* and subgenus *Chimarra* was provided by Blahnik (1998).

Key to males and females of species of *Chimarra* from Bougainville Island

- 1. Males .....2
- Females .....6
- 2. Inferior appendages in lateral view, long and slender, length > 3.5 times width (Figs 1, 4).....3
- Inferior appendages in lateral view, not long and slender, length < twice width (Figs 7, 10)..... 4

3. Inferior appendages, very long and slender over the whole length, length > 5 times width (Figs 1–3)..... *Chimarra longpela*
- Inferior appendages, long and slender over the apical half, broadened in basal third, length < 4 times width (Figs 4–6)..... *Chimarra panguna*
4. Inferior appendages with large process present on mesal margin (Fig. 8); phallus with dense brush of pale spines apically (Figs 7–9)..... *Chimarra pinga*
- Inferior appendages without process present on mesal margin; phallus without dense brush of pale spines apically (Figs 11, 14) ..... 5
5. Inferior appendages in lateral view widely bifid (Fig. 10)..... *Chimarra biramosa*
- Inferior appendages in lateral view not bifid (Fig. 13) ..... *Chimarra yuleae*
6. Abdominal segments VIII and IX short and robust (Fig. 21)..... *Chimarra biramosa*
- Abdominal segments VIII and IX long and slender (Figs 22, 23)..... 7
7. Abdominal segments VIII and IX in ventral view, of similar width, and not tapered apically (Fig. 22) ..... *Chimarra pinga*
- Abdominal segments VIII and IX in ventral view, not of similar width, tapered apically (Figs 23, 24)..... 8
8. Abdominal segment IX extended apically to form an elongated point Figs 23, 23a)..... *Chimarra longpela*
- Abdominal segment IX not extended apically to form an elongated point (Fig. 24)..... *Chimarra yuleae*

*Chimarra longpela* sp. nov.

Figures 1–3, 17, 23, 23a

*Type material.* Holotype male, Papua New Guinea, Bougainville I., Panguna, light trap, 7 Dec 1989, C. Yule (NMV T-17489).

Paratypes, all same locality and collector as holotype: 1 male, 13 Apr 1988 (genitalia prep. PT-1795, figured); 1 male, Mar 1989; 1 male, 19 Apr 1988; 3 males, 17 Dec 1988; 2 males, 2 females (genitalia prep. CT-284, figured), 29 Jan 1989; 1 female, Feb 1989; 1 female, Apr 1989, 1 female, 1 Oct 1988 (all NMV).

*Other material examined.* Papua New Guinea, Bougainville I., Konaiano Ck, Panguna, 24 Sep 1988, C. Yule, 1 female (NMV).

*Description.* General colour brownish, including head, mesothorax and wings; although triangular area on head between ocelli dark brownish. Wing venation: forewing veins Rs and M curved and thickened basal to discoidal and median cells (Fig. 17); forewing with forks 1, 2, 3 and 5 present; hindwing with forks 1, 2, 3 and 5 present.

Male. Genitalia dark brown. Ventral process on segment IX absent; inferior appendages in lateral view, very long and slender, length about 6 times width (Fig. 1), in ventral view, straight and slender, length about 5 times width, tapered slightly apically (Fig. 2); lobes of tergum X simple, divided dorsomedially for most of length (Fig. 3); phallus tubular with a conspicuous dark spine embedded subapically (Figs 1, 3).

Female. Abdominal segments VIII and IX elongate and slightly laterally compressed,

segment IX extended apically to form an elongated point; cerci short (Figs 23, 23a).

Length of forewing: male 5.0–5.9 mm, female 4.9–5.8 mm.

*Etymology.* *Longpela* — New Guinea pidgin word for long, referring to the inferior appendages of the male.

*Distribution.* Papua New Guinea, Bougainville I. (males known only from the type locality).

*Remarks.* In the male, the extremely elongate and slender inferior appendages are distinctive. The female genitalia are also extremely elongate and similar to *C. yuleae* sp. nov. and *C. pinga* sp. nov. *Chimarra longpela* females can be distinguished by the elongated point on abdominal segment IX.

*Chimarra panguna* sp. nov.

Figures 4–6, 18

*Type material.* Holotype male, Papua New Guinea, Bougainville I., Panguna, 29 Aug 1988, C. Yule (NMV T-17503).

Paratype male, same data as holotype: genitalia prep. CT-282, figured (NMV).

*Description.* Male. General body colour brown, head and mesothorax dark brown contrasting with pale warts; wings brownish. Wing venation: forewing vein Rs curved anteriorly basal to discoidal cell (Fig. 18); forewing with forks 1, 2, 3 and 5 present; hindwing with forks 1, 2, 3 and 5 present.

Genitalia brown. Ventral process on segment IX absent; inferior appendages broadest basally, narrowed at about half length, apical half slender, length about 3 times width (Figs 4, 5); lateral lobes of tergum X simple, divided dorsomedially for most of length (Fig. 6), shorter than inferior appendages, slightly downturned apically; phallus tubular, inserted between lateral lobes, with 2 dark spines embedded subapically and basally (Figs 4, 6).

Female unknown.

Length of forewing: male 4.1–5.0 mm.

*Etymology.* *Panguna* — named after the type locality (Panguna), noun in apposition.

*Distribution.* Papua New Guinea, Bougainville I. (known only from type locality).

*Remarks.* The males of *C. panguna* can be distinguished from other Bougainville species by the slender apical half and robust basal half of the inferior appendages.

### *Chimarra pinga* sp. nov.

Figures 7–9, 19, 22

*Type material.* Holotype male, Papua New Guinea, Bougainville I., Panguna, light trap, 17 Dec 1988, C. Yule (NMV T-17505).

Paratypes, all same locality and collector as holotype: 1 male, 20 Jan 1988 (genitalia prep. PT-1793, figured); 1 male, Feb 1989; 1 female, 19 Dec 1989 (genitalia prep. CT-286, figured) (all NMV).

*Description.* General body colour pale, including head and mesothorax, although triangular area on head between ocelli dark brownish; wings brownish. Wing venation: forewing discoidal cell veins R4-5 and R2-3 thickened basally, Rs curved anteriorly basal to thickening (Fig. 19); forewing with forks 1, 2, 3 and 5 present; hindwing with forks 1, 2, 3 and 5 present.

Male. Genitalia dark brown. Ventral process on segment IX absent; inferior appendages in lateral view subtriangular, length about 1.5 times width (Fig. 7) with a mesal digitiform projection subapically (Figs 8, 9); lateral lobes of tergum X simple, slightly truncated apically, divided dorsomedially for most of length (Fig. 8); phallus tubular, dilated apically with a field of small, pale spines, and with conspicuous dark spine embedded subapically (Figs 7–9).

Female. Abdominal segments VIII and IX in ventral view, long and slender, of similar width, and not tapered apically; cerci short (Fig. 22).

Length of forewing: male 5.1–5.2 mm, female 5.7 mm.

*Etymology.* *Pinga* — New Guinea pidgin word for finger, referring to finger-like mesal projection on the inferior appendages of the male.

*Distribution.* Papua New Guinea, Bougainville I. (known only from type locality).

*Remarks.* *Chimarra pinga* is a distinctive species in that the male has digitiform projections on the inferior appendages and a phallus with an apical 'brush' of spines, separating it from all known Australasian species. The female differs from other Bougainville species on the basis of the abdominal segments VIII and IX, having the combination long and slender, of similar width, and not tapered apically.

### *Chimarra biramosa* Kimmins

Figures 10–12, 16, 21

*Chimarra biramosa* Kimmins, 1957a: 292, figs 4a, 5.—Neboiss, 1986: 108.

*Type material.* Holotype male, Solomon Islands, Guadalcanal I., Tapenanje, 10–15 Dec 1953, J.D. Bradley (BMNH). Type not seen.

Paratypes, 1 male, 6 females, all same data as holotype (BMNH). Paratypes not seen.

*Material examined.* 1 male, Papua New Guinea, Bougainville I., Arawa 10/39, 21 Dec 1989, C. Yule (NMV); 1 male, same locality and collector, 13 Jun 1988 (genitalia prep. PT-1797, figured); 1 female, same loc. and collector, 12 Mar 1988; 1 female, same loc. and collector, 14 Aug 1988 (genitalia prep. CT-283, figured); 1 female, same loc. and collector, 25 Dec 1989; 1 female, Panguna, light trap, 29 Jan 1989, C. Yule; 2 females, Panguna, 3 Dec 1987, C. Yule (all NMV).

*Description* (revised after Kimmins, 1957a). General body colour brown, head and mesothorax dark brown contrasting with pale warts; wings brownish. Wing venation: forewing vein Rs slightly curved basal to discoidal cell, forewing with forks 1, 2, 3 and 5 present (Fig. 16); hindwing with forks 1, 2, 3 and 5 present (Kimmins 1957a: fig. 4a).

Male. Genitalia dark brown. Ventral process on segment IX absent; inferior appendages in lateral view short with dorsal extension basally (i.e. bifid or biramous) (Fig. 10), in ventral view, broad, tapering apically (Fig. 11); lateral lobes of tergum X simple, length almost as long as inferior appendages (Fig. 12); phallus tubular, with conspicuous asymmetrical dark spine subapically (Figs 10–12; Kimmins 1957a: fig. 5a–c).

Female. Abdominal segments VIII and IX



short; segment VIII dark brownish; segment IX with pair of dark brown sub-triangular ventral plates; cerci short (Fig. 22; Kimmins 1957a: fig. 5d).

Length of forewing: male 4.1–4.5 mm, female 5.0–5.2 mm.

*Distribution.* Solomon Islands, Guadalcanal I. and Papua New Guinea, Bougainville I.

*Remarks.* *Chimarra biramosa* males differ from all other Australasian species in the widely bifid inferior appendages of the male (Kimmins, 1957a). The female differs from the other Bougainville species in having short abdominal segments VIII and IX. Kimmins' (1957a) figures have been redrawn to allow direct comparisons and to accompany the description that is revised in light of new interpretations of *Chimarra* genital structures.

#### *Chimarra yuleae* sp. nov.

Figures 13–15, 20, 24

*Type material.* Holotype male, Papua New Guinea, Bougainville I., Panguna, light trap, 17 Dec 1988, C. Yule (NMV T-17509).

Paratypes, all same locality and collector as holotype: 1 male, 3 Dec 1987 (genitalia prep. PT-1792, figured); 1 male, 29 Jul 1988 (genitalia prep. PT-1796); 1 male, Feb 1989; 1 female, 17 Dec 1988 (genitalia prep. CT-285, figured); 1 female, Apr 1989 (all NMV).

*Description.* General body colour pale, including head, mesothorax and wings. Wing venation: forewing with a heart-shaped raised thickening at the junction of veins M1-2 and M3 (Fig. 20); forewing with forks 1, 2, 3 and 5 present; hindwing with forks 1, 2, 3 and 5 present.

Male. Ventral process on segment IX absent; inferior appendages in lateral view triangular, narrowed basally, broadened apically, with apicodorsal projection, length about same as width, with mesal flange and tapering to acute apex (Fig. 13), in ventral view, basically sub-rectangular (Fig. 14); lateral lobes of tergum X elongate, extending further than inferior appendages, slightly upturned apically; phallus tubular, with a conspicuous ventral dark spine embedded subapically (Figs 13–15).

Female. Abdominal segments VIII and IX in ventral view, not of similar width, tapered apically; cerci short (Fig. 24).

Length of forewing: male 5.1–5.3 mm, female 6.0–6.1 mm.

*Etymology.* The species is named for Cathy Yule (collector).

*Distribution.* Papua New Guinea, Bougainville I. (known only from type locality).

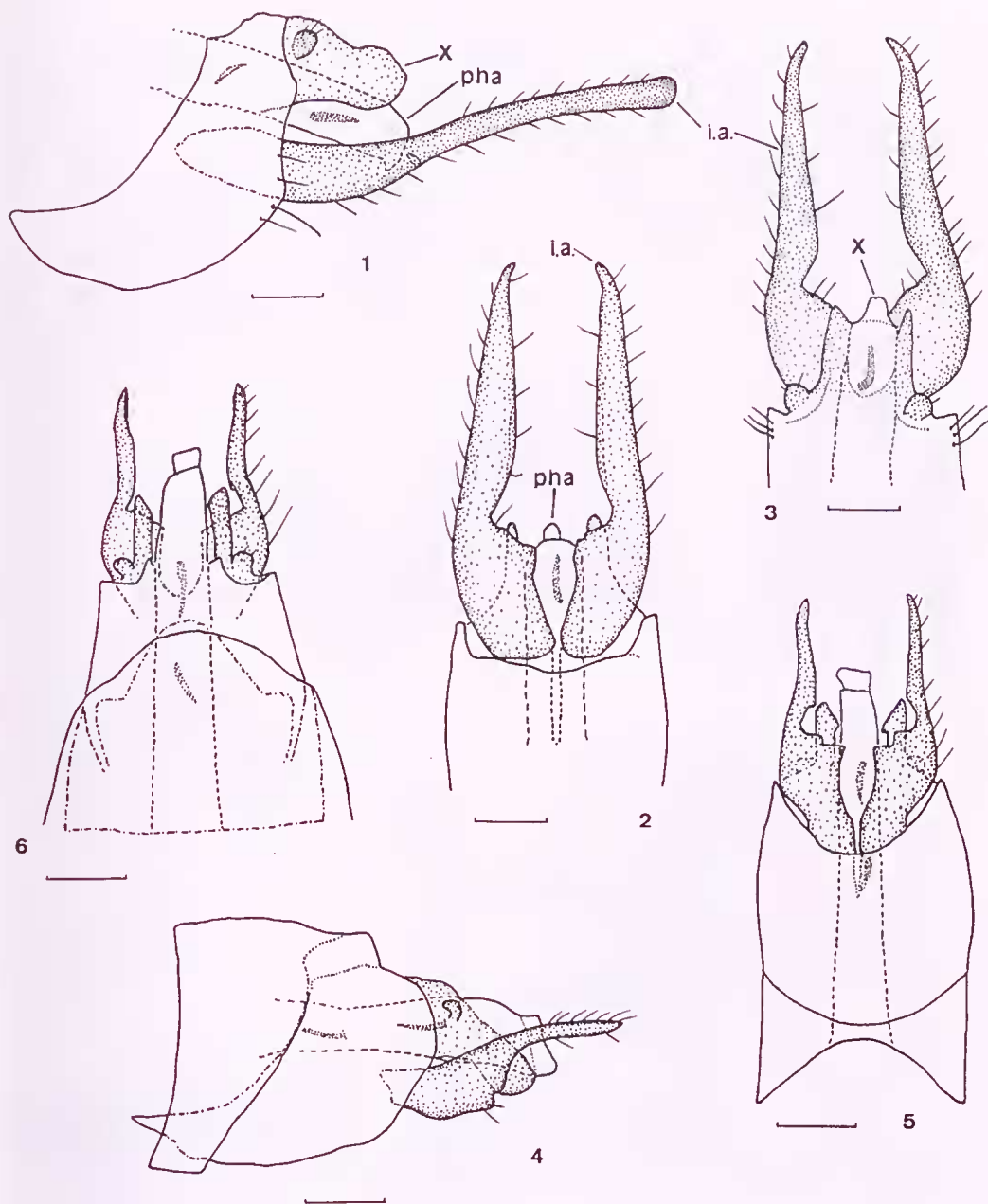
*Remarks.* In the male, the distinctive triangular inferior appendages allow separation from other Bougainville species. The female genitalia is very similar to *C. longpela* but lacks the elongate point on segment IX.

#### Acknowledgements

I thank Ms Cathy Yule for collecting all the material studied, Dr Arturs Neboiss (NMV) for providing access to the specimens, and him, John Dean and two anonymous referees for comments on drafts of this manuscript.

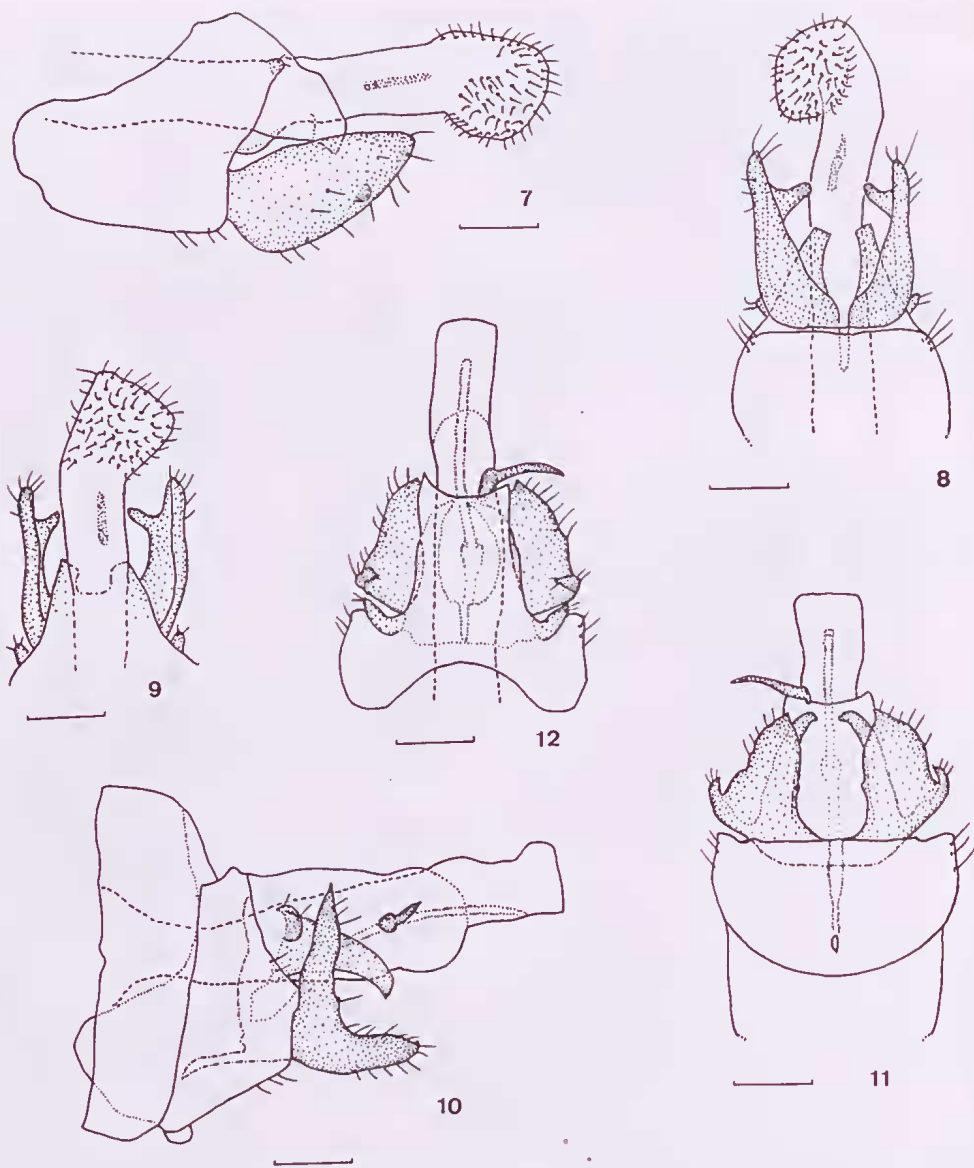
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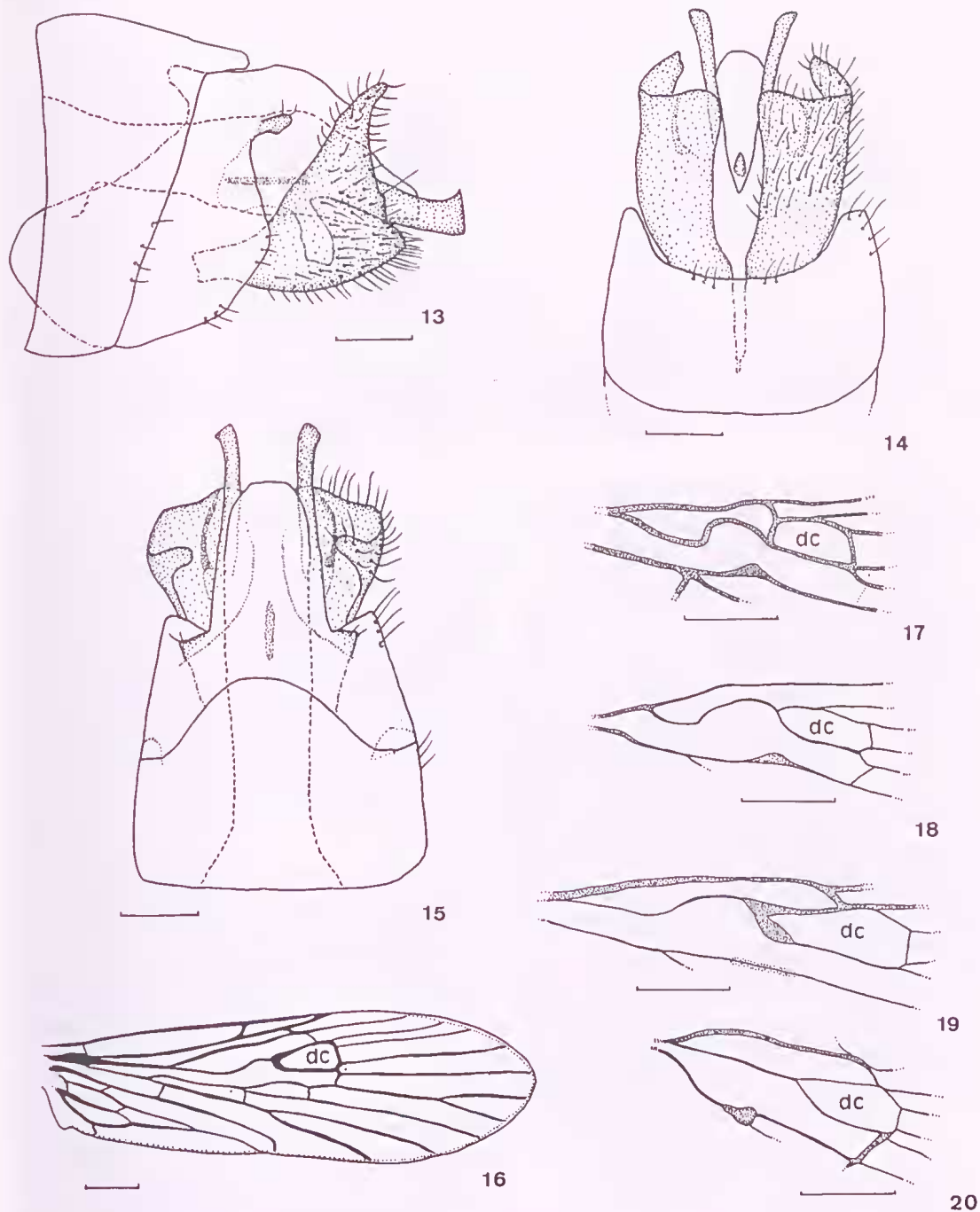
Figures 1–6. *Chimarra* spp. Male genitalia in lateral, ventral and dorsal views. 1–3: *Chimarra longpela* sp. nov. 4–6: *Chimarra panguna* sp. nov.

Abbreviations: i.a., inferior appendages; X, tergum X; pha, phallus. All scale lines 0.1 mm.



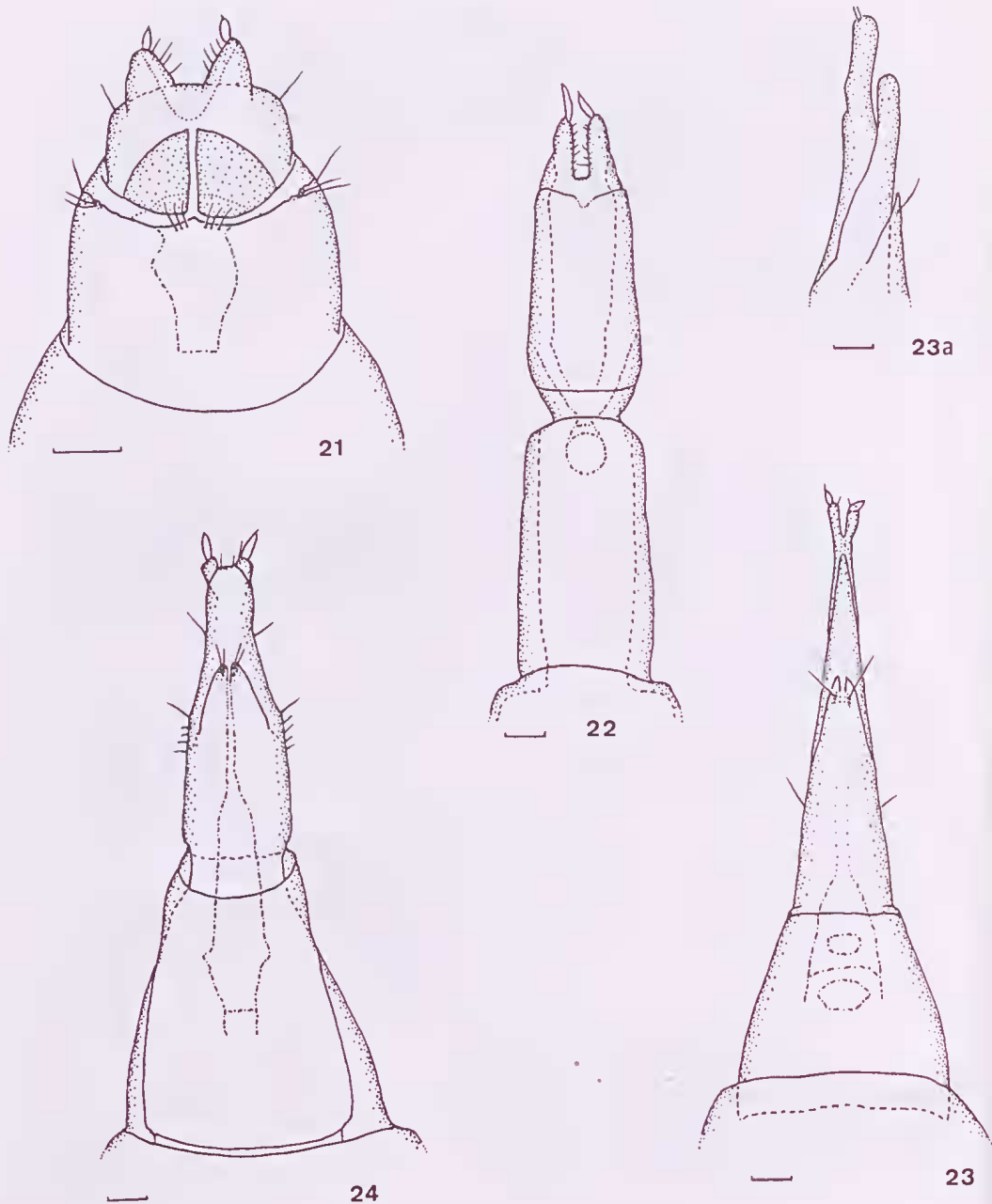
Figures 7-12. *Chimarra* spp. Male genitalia in lateral, ventral and dorsal views. 7-9: *Chimarra pinga* sp. nov. 10-12: *C. biramosa* Kimmins.

All scale lines 0.1 mm.



Figures 13–20, *Chimarra* spp. Male. 13–15: Genitalia in lateral, ventral and dorsal views. *Chimarra yuleae* sp. nov. 16: *Chimarra biramosa* Kimmins, forewing. 17–20: section of forewing. 17: *Chimarra longpela* sp. nov. 18: *Chimarra pangma* sp. nov. 19: *Chimarra pinga* sp. nov. 20: *Chimarra yuleae* sp. nov.

Abbreviation: dc, discoidal cell. Scale lines. Figs 13–15: 0.1 mm; Figs 16–20: 0.5 mm.



Figures 21–24, *Chimarra* spp. Female genitalia. 21: *Chimarra biramosa* Kimmins, ventral view; 22: *Chimarra pinga* sp. nov., ventral view. 23, 23a: *Chimarra longpela* sp. nov. 23: ventral view; 23a: lateral view. 24: *Chimarra ynleae* sp. nov. ventral view.

Abbreviations: IX, abdominal segment nine; VIII, abdominal segment eight. All scale lines 0.1 mm.